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<http://urn.nb.no/URN:NBN:no-30971>**Pål Nygaard**

Professional Autonomy versus Corporate Control

Abstract: Professionalism and bureaucracy tend to be understood as incompatible systems of work organization, represented by the ideals of collegiality and autonomy versus control and supervision. I present a historical case study from early 20th century Norway examining the potential clash between efforts made toward professionalization and bureaucratization in industry. Based on my findings, I argue that there is neither an inherent conflict between professionalism and bureaucracy nor static national trajectories at the level of professional versus bureaucratic work organization.

Keywords: professionalism; bureaucracy; engineers; engineering; history; transnational

For a long time, theories on professions brought forth the contention of an inherent conflict between professionalism and bureaucracy, contributing to a division between the sociology of professions and organizations. During the past decade, various scholars have contested both the argument of conflict and the fruitfulness of division (Bourgeault, Hirschhorn, & Sainsaulieu, 2011; Muzio & Kirkpatrick, 2011; Evetts, 2010). Recent trends toward organizing the work of professions in large organizations and stronger monitoring of professions seem to have been major impulses underlying this shift, which in turn have inspired a rethinking of the issue of professional autonomy.

Typically, professional autonomy is considered limited within organizations. New perspectives on professions and organizations depict organizations as assets to professional strategies (Suddaby & Viale, 2011). With this article, I wish to add a new dimension to the discussion of professional autonomy within organizations and, in so doing, bring attention to knowledge and the conditions of knowledge production. I present a historical case study of interrelations between the emergence of large industrial corporations and engineering as a profession in Norway.

Industry in Norway became increasingly based on science at the turn of the 20th century. This was particularly true in the chemical and electrometallurgical industries, industries in which a new type of industrial organization was developing. The established industries of textile and wood processing and their workshops were at a different level of technological complexity and scale of production. Developments in the natural sciences and the access to hydroelectric power paved the way for the new industries. The new businesses that developed created not only new opportunities but also challenges for Norwegian engineers.

The introduction of the new industries was the work of engineers. The craftsman-like industrial organization of the past was insufficient for entry into

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industries of higher technological complexity and for production of a larger scale. Engineers acted as mediators between natural science and business, and by fulfilling this role, they opened up new industrial possibilities. Increased technological complexity and larger scale production were thus interconnected with the development of the Norwegian engineering profession.

One industrial enterprise in particular characterized the relationship between engineers and industry in Norway: Norsk Hydro (Hydro), a fertilizer company, became the first company to establish business successfully in an international market in the new industries. The success achieved by Hydro was first and foremost a heroic story of engineering; Hydro was founded on the research and development conducted by a group of engineers and scientists who created the world's first artificial fertilizer production process. It seemed as if the industry and the engineering profession strengthened each other.

Industrial espionage

There was, however, a potential clash of interest between professionalization and industrialization. Industrial corporations in a capitalist economy tend to seek control of all their capital – including employees' knowledge. The emerging engineering profession also sought to control its technological knowledge. During the interwar years, this potential clash of interest was triggered when a group of engineers was accused of industrial espionage by Hydro.

These engineers were all former employees of Hydro and were all connected to a consultancy firm that specialized in providing services within Hydro's branch of industry. When they were given the contract for the construction of a new factory in Poland, which was perceived as an exact duplication of Hydro's, the suspicion of industrial espionage emerged. The accusations led to a decade of debate over the role of engineers in industrial companies: Who had intellectual property rights of knowledge derived from engineers' work within industrial corporations?

The immediate and direct cause of the conflict had its basis in the internal development of Hydro and the role of engineers in this company. This situation provided me an opportunity to analyse the conditions under which Norwegian engineers in industry were working during the first decades of the 20th century and how these conditions were changing in relation to industrial development and efforts made toward professionalization by engineers.

The backdrop of this story is what often is referred to as the basic dilemma of engineers in industry – the balance between professional autonomy and corporate control. Although this idea originated from scholars studying American engineers (Layton, 1986), this dilemma seems to be a common challenge for engineers striving for unity and professionalization across national boundaries (Jakobsen, Andersen, Halvorsen, & Myklebust, 1998). This article attempts to uncover how this basic dilemma emerged in Norway and how engineers and industrialists responded to it. I argue that the issue arose as a result of transnational entanglements of professionalism, economic organization, and knowledge production.

The case presented here is based on a historical reconstruction of documents from three sources: legal documents from trials, internal documents from Hydro, and minutes from meetings of the Norwegian Engineering Society (NIF). In historical reconstruction, emphasis is placed on achieving insight and an understanding of particular events and actors on their premises, thereby making the contemporary context vital. Attention is driven toward a critical examination of the documents' situation of origin and how this context can provide insight into

previous events and actors. For more detailed information on data and methods, see Nygaard (2003).

This article, which is structured around the so-called basic dilemma of engineering, presents a discussion of different perspectives on the relationship between professions and bureaucracy, with an emphasis on the engineering profession. To highlight differences between disciplinary and national interpretations of this relationship, I have chosen a narrative approach based on my historical case study on the engineers' role in Hydro. Based on the findings of this case study, connections are made to German and American modes of industrial organization, as well as to Continental and Anglo-American theories on professionalism and bureaucratization. In my opinion, this case highlights the historical contingency of the relationship between professionalism and bureaucracy.

I begin by presenting the discovery of what was perceived as industrial espionage. I then link the debate arising from these allegations to the so-called basic dilemma of engineers and its connection to theories on the relationship between professionalism and bureaucracy. Next I unravel the trajectories leading up to the judicial conflict between Hydro and its former engineers, which include entanglements with German and American modes of industrial organization. Finally, the effects of the case and transnational entanglements are discussed in connection to the debates on professional autonomy and bureaucracy.

Professionalism and bureaucracy

It was by a coincidence that Hydro in 1930 uncovered what it called industrial espionage. When an apparatus document was misdirected to Hydro by an engineer from the workshop enterprise Kværner, Hydro's leaders were surprised to learn that the document contained a drawing of an apparatus that was very similar to their most recently developed technology, which they thought had been kept secret. To their disappointment, they could confirm that the document was not intended for them but rather was meant for Emil Collett, an engineer and a former research manager at Hydro who, following his departure from Hydro, had founded a firm that specialized in consultancy work. The employees at his firm were all former Hydro engineers. Hydro learned that these engineers were contracted to establish a competing fertilizer factory in the city of Tarnów on assignment by the Polish government. Hydro's leaders feared that this would be an exact duplication of their own factory.

The engineers involved in this affair had previously worked at Hydro but were let go when a major reorganization occurred in the company during the 1920s. Hydro suspected that these engineers had kept their drawings and documents after they left the company and were now using them in their new positions. Based on this suspicion, Hydro accused the engineering consultants in 1931. A few days later, the office of Collett and his co-workers in Paris was raided by French police. During this raid, the police found documents from Hydro. Hydro's managing director, Alex Aubert, later claimed that the volume of these documents was comparable to that in the firm's archive.

In court, Aubert delivered a dynamic speech in which he accused the engineers of national treason. Through their illegal use of Hydro's secrets in competing companies' services, they jeopardized the Norwegian economy and employment. This view was refuted by Thomas Chr. Hagemann, one of the accused. In an article, Hagemann (1932) argued that the real national traitor was Aubert. Through his position as the managing director of a company owned by international financial

capitalists, the French bank Paribas, and the Swedish Svenska Enskilda Banken, he served their claim for profit rather than Norwegian farmers' need for fertilizer and Norwegian citizens' need for food. As arguments were waged, the question of how knowledge production within industrial corporations should be organized was raised. Could the corporation demand property rights on knowledge derived from the individual efforts of engineers and restrict these engineers from using this knowledge elsewhere?

Hagemann was an original among Norwegian engineers. In an earlier article, he argued for the destruction of Hydro's monopolistic position as a fertilizer producer in Norway through the creation of farmer-owned fertilizer factories in every parish (Andersen & Yttri, 1997). The idea was probably inspired by Thorstein Veblen, a renowned American intellectual who forecasted the emergence of a "soviet of technicians" (Veblen, 1921). According to Veblen, the welfare and progress of American society called for engineers to take over the economic affairs from the "captains of industry", or the vested interest, because they sabotaged production.

The demand for profit, inherent in the capitalist system of ownership and finance, clashed with the productive potential of engineers' knowledge and activity. Engineers' loyalty to vested interests – not to citizens and society – was what constituted the problem with the organization of the American economy. Veblen called for engineers to release their altruistic potential by assuming a more autonomous role. His ideas have become a major reference point in research on engineering professions. Although Veblen's normative approach and forecasts today are seen more as an anachronism, the basic dilemma of engineers, which he identified, continues to resonate.

In his classic study of the history of American engineers, Layton (1986) argued that Veblen misunderstood the basic dilemma. It was bureaucracy – not the vested interests or the capitalist organization of the economy as such – that hindered engineers' activities. According to Layton, the pursuit of profit in business and the attempts by engineers to improve productivity through technological development were, in fact, compatible. Both business and engineering science profited as productivity improved. In addition, Layton argued that if a soviet of engineers were to emerge, it would not resolve the basic dilemma facing engineers. This basic dilemma involved the engineers' position in bureaucratic organizations, private capitalist or government, and their ideal of becoming free professionals.

By stressing the clash of organizational logics between bureaucracy and professionalism, Layton highlighted an important tradition in the Anglo-American scholarly literature on professions. Despite great differences, the classical works by Talcott Parsons (1954), Margali Sarfatti Larson (1977), Andrew Abbott (1988), and Eliot Freidson (2001) share the notion that professionalism in theory is a distinctly different type of work organization than bureaucracy. The core concept of the professions as a group of autonomous and free actors whose activities are organized around the principle of collegiality represents a central defining characteristic in the theory of professions in contrast to the hierarchical line and staff organization of bureaucracy.

These ideal-typical understandings of the professions led Conze and Kocka (1985), two German historians, to deny the existence of professions in 19th-century Germany. Because the academic workers in Germany were not free professionals, but sought work and recognition within state bureaucracies, Conze and Kocka launched the concept of *Bildungsbürgertum* as an alternative to professions. Their focus on the interconnections among academically based occupations, the state, and national cultural trajectories was part of a critical historical-sociological

appropriation of the theory on professions in Europe around 1990. Based on historical evidence, scholars rejected the theoretical claim of an inherent conflict between professionalism and bureaucracy (Torstendahl, 1991; Torstendahl & Burrage, 1990).

This description bears resemblance with those given in studies on the professional history of engineers. The studies of Layton (1986) and Gispén (1989) provide analyses where professionalism is more contested from corporate control in the United States. This feature is often explained in relation to national cultural trajectories. Industrial organization and engineering activities in Germany are structured around *Bildung* and the welfare of state and society, whereas managerialism and corporations' ability to maximize profit are depicted as the American way of organizing engineering activities. This pattern deviates from the more general portraits in the literature on professions, where the United States represents professionalism and Germany represents bureaucracy as the main ideals of work organization. As Gispén (1988) has shown, these differences may primarily be caused by different theoretical and analytical perspectives.

By comparing the national trajectories of European modernization, both the Bielefeld and the Swedish Collegium for Advanced Study in the Social Sciences (SCASSS) research projects tried to determine the role and degree of professionalism in the investigated nations' histories. This *Sonderweg* approach obscured scholars' attention to the entanglements of professional, organizational, and political ideas across national boundaries. Accounting for both national trajectories and the transnational environment ideas on professionalism, knowledge diffusion, and institutional solutions have always been developed within, I find it easier to understand the historical contingency of the relationship between professionalism and bureaucracy (Bauerkämper, 2009).

The actors and events that shaped the development of Norwegian industry and engineering as a profession were not limited by national boundaries but rather were entangled in a transnational context of work, knowledge, and organizational diffusion. Hydro and engineers in Norway were influenced by both German and American ways of organizing engineering activities. The entanglements involving Hydro and German and American industrial corporations and their engineers provides a case in which the usual ways of portraying differences between Germany and the United States in the literature on professions and economic history are challenged. The diffusion of knowledge and organization across national boundaries caused an amalgamation of ideas and solutions, which transformed and restructured the original features in such a manner that claiming an inherent conflict between professionalism and bureaucracy seems to be an unsatisfactory perspective.

From consultant to employee – the rise of big business

The balance between business loyalty and engineers' role as free professionals was the essence of the judicial conflict between Hydro and its former engineers. Entering an unlegislated field of justice in Norway, this case had great principal importance and initiated a debate on the role of engineers in business. As a consequence of the advent of chemical and electrometallurgical industries, more science-based and complex technologies, and larger scale of production, the engineering occupation underwent changes during the interwar years in Norway. On the one hand, this development made engineering the dominant profession in business (Benum, 1975). On the other hand, the most common position for an

engineer was in the transition from engineering consultant to full-time employee (Halvorsen, 1994).

Consultancy work was the main activity among Norwegian engineers at the turn of the 20th century, irrespective of positions in industrial companies, colleges, or government agencies (Børresen, 1991). Through this organization of engineering activity, engineers were very much in control of their knowledge and work conditions. Before each assignment, engineers and their clients – it did not matter whether the clients were industrial companies or government agencies – negotiated which task to tackle and under what conditions. With each contract, engineers gained experience in various fields and were able to apply the knowledge they had acquired while serving clients in future assignments.

A group of highly educated engineers became the main architects as new industries emerged at the turn of the 20th century. The top candidates from the elite engineering colleges of Germany gathered around Sam Eyde, an engineer who had established an engineering consultancy firm in Norway (Sogner, 2003; Grimnes, 2001). Eyde's firm was originally a traditional engineering consultancy business that contracted the building of railway stations and bridges and provided expertise to various companies experiencing technical problems. This changed as he gained property control of several of the large waterfalls in Norway. These resources were ideal assets for gaining entry to the industries of chemical and electrometallurgical production.

Several attempts at establishing industrial ventures were made by this group of engineers, with some failing and others succeeding (Sogner, 2003). Fertilizer production was one such venture that really took off. In cooperation with Kristian Birkeland, a leading physicist, Eyde developed the world's first industrial method of artificial fertilizer production. With the help of investments from Svenska Enskilda Banken and the French bank Paribas, Hydro was established in 1905.

Hydro's mode of production highlighted the new organization of engineering work that was emerging in the new industries. Because the technical services of engineering consultants were insufficient to develop, manage, and maintain this mode of production. Hydro solved this problem by employing a staff of full-time, salaried engineers (Andersen, 2005). These engineers were given tasks according to which units in the organization they belonged. Based on the engineers' activities during the first two decades, the transition from consultancy work to employee seemed to have been relatively smooth. One of the terms of appointment made it clear that there were no limits to engaging in consultancy work. The inclusion of this clause raises the following question: Why were engineers in a full-time position allowed to have such a clause in their terms of appointment?

Hydro's first years of operation constituted its pioneering phase, with constant tests of the production and the organization. Thus, the engineers who were full-time employees enjoyed vast freedom in their activities, from which a corporate culture dominated by autonomous engineers grew. This type of corporate culture suited the pioneering years of Hydro and its group of elite engineers. The engineers continued to plan and do consultancy work in other business ventures. These activities were profitable for not only the engineers but also Hydro. While visiting other industrial projects, the engineers acquired knowledge useful for making advancements in Hydro's fertilizer production and factory building (Andersen, 2005).

The freedom to engage in other businesses and the openness among industrial companies resulted in the thriving development of industrial projects in the chemical and electrometallurgical industries during the two first decades of the

20th century in Norway. An important feature of the open industrial environment was obviously the personal connections being forged among young, aspiring engineers who were educated at elite technical colleges in Germany. It is important to stress that the freedom to operate beyond company borders was not a new feature in Norwegian business. The mobile and autonomous engineering role merely continued the engineering tradition that had been established through consultancy work. This feature of organizing engineers' work bears strong resemblance to the ideal-typical notion of the free professional. However, during the interwar years, forces emerged to overthrow the ideal of autonomy for engineers in full-time positions at industrial enterprises.

Economic crisis and international markets

The economic growth and ventures of the 1910s were replaced by stagnation and recurring economic crises during the 1920s in Norway. The economic circumstances put the brakes on the development of further industrial projects and, thus, contributed to decreasing the market for consultancy work. In addition, companies struggling to cope with the economic crises became less interested in making investments in research and development. Instead of employing staffs of engineers to develop their own technologies, companies once again started acquiring licenses from internationally established corporations (Sejersted, 1993).

The industry's decreasing demand for engineering activities coincided with an increase in the number of engineers in Norway (i.e., graduates from the Norwegian Institute of Technology started entering the labour market at this point in time). Facing unemployment, many traveled abroad, chiefly to the United States (Lange, 1988). NIF feared this development would diminish the engineering profession's status, and debated whether the increasing numbers of engineers in official positions threatened the status of engineers as free professionals (Halvorsen, 1994).

These concerns likely stemmed from events taking place in Germany, where industrial development was far more advanced. German industrial corporations were larger, more complex, and better organized than their Norwegian counterparts. These corporations generally used more advanced technologies, and their mode of production was larger in both scale and scope (Chandler & Hikino, 1990). At this point in history, the degree of industrial organization represented the greatest difference between Norway and Germany. At the beginning of the 20th century, there was a strong coordination of industrial activities through investment banks and cartels in Germany (Chandler & Hikino, 1990), a feature that barely existed in Norway (Sejersted, 1993).

The strong cooperation and organization of German industrial activities created an autonomous engineering culture within the bureaucracies that were created. At the same time, mechanisms were established to monitor and control subcontractors and international business partners. As I have previously mentioned, these measures of corporate control were non-existent in Norwegian industry before the 1930s. On the other side of the Atlantic, however, corporate control was even more widespread than in Germany. In Chandler's (1990) vocabulary the difference between German and American industrial organization were "organized" and "competitive" managerial capitalism. Accordingly, the competitive environment of industrial business in the United States led to stronger monitoring of engineering activities within the organizations than in Germany.

The ideal of the autonomous engineer in industry was contested at Hydro during the 1920s. Blinded by their success, engineers in leading positions failed to

monitor the technological advancements being made internationally and to foresee the emergence of business cooperation among the large chemical corporations in Germany. By 1920, the German company BASF had developed a superior technology to Hydro's fertilizer production process. In addition, the major chemical companies, including BASF, were about to set up a trust that would dominate the international fertilizer market. Because of their lack of attention to these developments, the managers at Hydro found themselves in a critical situation in the mid-1920s. The future of Hydro rested on its ability to make a successful transition to an improved technology and to consolidate its market position (Andersen, 2005).

As Hydro's owners and managers evaluated the situation, attention was drawn to the autonomous engineering culture that characterized the pioneering years. Although the company clearly benefited from this culture during the early years of development, the lack of organization and control of the engineering officials' work seemed less suitable as it attempted to return to business as usual. Moreover, there were growing concerns as to whether the engineers possessed the level of competence required for them to remain in charge of all functions in a modern international business. The affairs of Hydro involved complex actions that were of both economic and legal nature. When the company's future plans were laid in 1925, it became obvious that a major reorganization was needed—that is, the engineers' position and the autonomous role they had enjoyed would be reconsidered. To uncover these changes that occurred after 1925, I focus on Collett's career in the following sections. This prime suspect of industrial espionage highlighted how the engineers' autonomy at Hydro changed during these years of reorganization.

Comparing American and German cooperation

In 1925, Aubert was appointed as the new general manager at Hydro. Aubert had not previously worked at Hydro, which was perceived as a prerequisite for changing the corporate culture of autonomous engineers. The most urgent tasks to tackle were finding ways to obtain new technology and to gain access to international markets. Two options were considered: one American, the other German.

In its pursuit of options for obtaining new technology, Hydro hired Collett. He filled a temporary position as research manager. During his search for technological solutions, he visited the United States, where he was introduced to a new way of organizing technological development that would later inspire him. Nitrogen Engineering Corporation (NEC), a chemical engineering group, was an American engineering consultancy firm that differed from traditional consultancy firms in Norway in that it specialized in one branch of the industry and offered total technological assistance (Andersen & Yttri, 1997). It had developed a new fertilizer technology with the potential to compete with the German alternative.

In Germany, BASF was integrated into the chemical giant Interessengemeinschaft Farbenindustrie (IG Farben). The alliance of German chemical companies was the patentee of the most effective fertilizer technology and controlled, through its leadership in the international cartel, the fertilizer market. IG Farben, which dominated the chemical industry in Germany, was renowned for its widespread use of patents and legal restrictions on subcontractors so as to prevent knowledge of its technology from leaking. At this point in time, the industrial corporations in Europe, in general, did most of the research and development of technology themselves (Andersen, 2005).

Collett entered an industrial environment that was similar, in the sense of openness and the diffusion of technical knowledge, to that of the pioneering years before and during the First World War in Norway. NEC was an autonomous organization and contracted consultancy services within the competitive industrial market in the United States. The role of NEC as a technological developer contrasted with the conditions in Germany. The conditions of knowledge diffusion in Norway were, however, more in line with the American style of openness than the strict control that characterized conditions in Germany. The relatively small engineering community in Norway interacted closely with one another, and the boundaries among the various industrial enterprises were not absolute.

However, Hydro and Aubert were not eager to ensure autonomy for its engineers. The corporation viewed its operations in the international market as an opportunity to hunt for new technologies and partnerships. In this respect, IG Farben was far more attractive than NEC. In 1927, Hydro and IG Farben signed an agreement in which Hydro obtained access to technologies and markets and IG Farben received shares and a position on Hydro's board (Andersen, 2005).

As part of the 1927 agreement, IG Farben presented several organizational demands. An important part of these demands involved the conditions of engineering officials. The Germans were especially preoccupied with arrangements to prevent the leakage of technological knowledge. They demanded that all engineering officials at Hydro receive and sign the new terms of appointment. Two arrangements involving these terms were new to Norwegian industry. First, the engineers were obligated to maintain extensive secrecy, in the Norwegian sense; these rules applied to communication even between engineers working in different units within the company. Second, all engineers were bound to a quarantine of 2 years if they transferred to a competing company (Nygaard, 2003).

These arrangements were perhaps suitable in German industry, but the use of extensive control and the restriction of communication and mobility were unfamiliar in Norwegian business. Another aspect was the relatively small industrial milieu in Norway. The engineers and industrialists knew each other very well, both formally and informally. They met at functions, parties, and restaurants, and participated in bridge evenings together. It was obviously a giant challenge for engineers and industrialists to refrain from mentioning business matters on these occasions. Thus, the influence from Germany led to more corporate control of Norwegian engineers at Hydro. By contrast, if Hydro had cooperated with NEC, less corporate control would have resulted. One person in particular was affected by the new conditions of appointment for engineering officials at Hydro.

Was it industrial espionage?

When Hydro's quest for new technology ended, it no longer needed the services of Collett. In fact, he was one of the first to be laid off by Aubert during the company's reorganization. At this point, Collett resumed his consultancy work with new inspiration. Collett tried to set up his consultancy activities in line with those of NEC by offering total technical solutions within the chemical industries. This was a new venture in Norway, but the industrial and financial situation was not suitable for this line of business in the 1920s.

Those few companies operating in the chemical industries were struggling and not capable of making investments in technology. There hardly existed the financial capability in Norway to invest in the capital-intensive industries to which Collett aimed to provide services (Sejersted, 1993). Those companies were rather

inclined to obtain licenses internationally, as shown even in the case of Hydro. In an effort to promote his new consultancy work strategy successfully, Collett moved his business abroad and based his office in Paris.

Using the connections he had made while working at Hydro, Collett went about selecting a team of highly competent engineers in the nitrogen processing industry. All his assistants were former employees at Hydro. However, when his firm managed to land its first major assignment, a contract with a fertilizer plant in Poland, he realized that he needed to hire additional employees. Suddenly, his attempts at hiring engineers from Hydro became unsuccessful. Collett then turned to an old friend at Hydro, Julius Blich, who showed great interest in the matter. Blich felt snubbed when the manager position of the new plant at Herøya was not given to him. The Herøya plant was a giant investment, built with the new and improved German technology, and was thus the state of the art in fertilizer production. Collett was obviously eager to acquire assistance from engineers with experience at this plant.

There were, however, obstacles of which Collett was unaware that interfered with his plans for hiring engineers from Hydro. The new conditions of appointment in the quarantine arrangement prohibited Hydro's engineers from engaging in a competing company's activities for 2 years. This arrangement frustrated Blich, who felt that his opportunities of further career advancement at Hydro were diminishing and that he was being denied the possibility to pursue opportunities elsewhere. During the course of a year, Collett and Blich met several times and discussed Blich's prospects of joining Collett's firm. However, Blich hesitated during the final steps of negotiation. He made contact with the engineering society, where he requested a principal and legal evaluation of the new terms of appointment at Hydro. Before Blich received an answer from the engineering society, Hydro acted on the suspicion that Collett's affairs were dubious. These steps resulted in two accusations of industrial espionage being put forth in the Norwegian legal system against the engineers Hagemann and Blich at Hydro's behest.

The trials consisted of two parts. First, Hagemann was charged; he was allegedly the one who had brought the apparatus document from Hydro to Collett. During the building of the new factory at Herøya, Hagemann received a short-term appointment at Hydro and became a member of the team that originally designed the key apparatus.

In his defense, Hagemann claimed that he had not taken any of Hydro's documents—only his own notes—when he left Hydro to join Collett. While working at Hydro, he had tried to design his own improved version of the apparatus in his spare time in hopes of getting it patented. These notes and his experiences formed the foundation of his apparatus design for Collett. He claimed that it would be impossible for engineers to suppress their knowledge—even knowledge deemed to be secret—because all experiences combined together in their minds and formed their technical know-how. It weakened Hydro's case severely that Hagemann did not receive the new letters of appointment and, thus, did not have a quarantine clause. The attorney-general gave Hagemann the benefit of the doubt and decided not to pursue the case against Hagemann further from the District Court.

Second, Blich put Hydro on trial, accusing the company of unjustly firing him. Hydro argued that Blich had leaked secret information about its production processes to Collett during their talks. One witness, a Hydro official subordinate to Blich, claimed that Blich had told him about one meeting with Collett; the

conversation between the Hydro official and Blich ended with Blich stating the following: “When I saw him [Collett] taking notes, I stopped talking” (Nygaard, 2003). Blich denied leaking any sensitive information from Hydro, claiming the right to commune with Collett. He also made the claim that his terms of appointment were too strict, pointing to the secrecy arrangements and the quarantine clause. This case went all the way to the Supreme Court of Norway, and Aubert became more and more anxious about the final outcome.

Throughout the trials, it became obvious that the activities of Collett, although dubious, merely followed the pattern established at Hydro. The defeats in court were damaging not only to Aubert personally but also to Hydro’s standing in relation to IG Farben. He was preoccupied with protecting the quarantine arrangement, as the case against Blich was to be tried in the Supreme Court. First, he contacted one of the leading legal experts in this area in Norway, Professor Ragnar Knoph, and gave him the task of writing a legal evaluation of the new terms of appointment at Hydro. However, Knoph’s legal evaluation did not go in favor of Hydro, stating that both the codes of secrecy and the quarantine clause put unreasonable restrictions on the engineers’ professional freedom.

In the case against Hagemann, the defeat was complete for Hydro. For making the accusation, Hydro was ordered to provide a substantial compensation to Hagemann. In the case against Blich, the ruling was unclear. Firing him was considered somehow legitimate but too harsh. However, the legal system was not the only arena that regulated the issue of professional autonomy versus corporate control during the 1930s.

The standard agreement

In 1930, NIF raised a proposal to establish a standard agreement for engineers. The proposal was put forth by its president, Claus Friman Dahl, another engineer who had been fired by Aubert in the late 1920s. As he launched his proposal to do so, he claimed that the society had received complaints about unfair terms of conditions from the society’s members and that these terms indicated a dangerous development that threatened the professional autonomy of engineers in Norwegian industry. Most likely the complaints to which he referred stemmed from Blich. The terms to which Friman Dahl referred when he raised the issue were similar to those of Blich.

Discussions about engineers’ conditions in industrial companies were intricate because engineers dominated managing positions in Norwegian industry; NIF thus tried to avoid raising these issues so as to prevent schism and alienation of either managers or officials. The proposal to formulate a standard agreement did cause great controversy among the representatives of NIF. A fraction of managers attempted to obstruct the proposal. Engineering officials were, however, very content with the society’s steps to promote their interests. Because the issue of standard agreement had been raised, engineers were finally confronted with a broad discussion on the conditions of engineering officials in industry.

To obtain approval for the standard agreement among employers, NIF approached the employers’ association and proposed the formation of a joint committee that would establish the terms in the standard agreement. An interesting aspect of the cooperation between the organizations was that both organizations had engineers as members.

One issue stood out as the most controversial: the quarantine arrangement. Among the members of the joint committee and the engineers, this arrangement

was seen as the most important issue. Addressing NIF's members of the joint committee, the editor of *Teknisk Ukeblad* (Technical Weekly Magazine), Ø. Lange (1932), called their work the most important battle for the advancement of welfare and technology in the 20th century. Arguing that time was an important issue, Lange urged on the joint committee's work. Lange's appeal to the joint committee to finalize the agreement was a response to a particular event.

The unlegislated situation gave the engineers an opportunity to influence the rule of law through the standard agreement. If the court ruling preceded the standard agreement, the conditions of engineering officials in industry would be determined by the legal profession – not by engineers. A court ruling would obviously set a precedent that would bind the joint committee. However, if the standard agreement was established before the trial ended, the court would have to take the agreement into account.

The engineering officials were not alone in thinking along these lines. Fearing what the joint committee might promote, Hydro's managing director, Aubert, paid close attention to its work. He was able to do so because Hydro's sales manager, Sverre Brønne, was appointed a member of the joint committee. With experience in establishing the new letters of appointment at Hydro and in writing a memo for the employers' association about the quarantine arrangement, Brønne not only represented Hydro's interests but also possessed knowledge about the topic at hand. Brønne proved to be a key person in the joint committee's work. He became the leader of the delegation of the employers' association and used his influence to promote his company's interests.

Hydro sets the standard

The internal affairs of Hydro were intimately involved in the formulation of the standard agreement. It is important to point out how much was at stake for Hydro regarding this issue. First, the revelation that its technology was being used at the new fertilizer factory in Poland was disastrous in light of the fact that Hydro's new business partner was IG Farben, which controlled its sales internationally. Second, the new terms of appointment were part of that agreement, and, thus, it was important to protect both during the trials and in the standard agreement.

Furthermore, the arrangements (i.e., ways in which to control engineering officials) were of particular interest to Hydro. In general, the remaining industrial enterprises in Norway did not have as sizable a staff of engineering officials, did not possess unpatented key technological processes, and, last but not least, did not have a business partner that defined specific organizational terms as IG Farben did (Sogner, 2003).

Most of the Norwegian industrial enterprises seemed content with the traditionally autonomous role of engineers. There was good reason to feel this way. The openness and mobility among engineers, engineering colleges, workshops, and industrial companies provided good conditions for knowledge diffusion. Although technical knowledge was sometimes leaked to possible competitors, most companies benefited from the advancements in technology that resulted from this openness. In the traditional industries of textile and wood processing and in the pioneering years of the chemical and electrometallurgical industries, this organization of engineering activity worked well. However, as the complexity of technology, scale and scope of production, and organizational size and bureaucratic level rose, attention shifted toward competition in an international market, which in turn

initiated a growing sense among employers that these developments called for more corporate control.

The steps taken by Hydro's owners and the new managing director represented a trend toward more corporate control over engineering officials in Norway. The employers' association carried out an internal evaluation of the joint committee's draft of the standard agreement. The evaluation revealed that other industrial enterprises were inspired by Hydro and that Hydro's new letters of appointment were copied. "Not of current interest" was, however, the most common response among the members of the employers' association to the strict secrecy arrangements and quarantine clause embedded in the draft. The issue of strengthening corporate control over engineering officials proved to be of current interest only in large industrial corporations, in which the creation of technological processes or devices played a decisive role in the attainment of market position.

Because the trials against the former Hydro engineers did not clearly state the legal status of Hydro's new terms of appointment, Aubert focused his efforts on the joint committee. An analysis of the minutes of a meeting of the employers' association concerning the standard agreement reveals that Aubert and Hydro dominated the outcome of the standard agreement. According to the minutes, the quarantine clause represented the crux of the committee's work. The representatives of NIF had made huge compromises in relation to this clause. Confronted with a quarantine time of a maximum period of three years, Brønne (Hydro's manager) replied, "3 years, too short." Given the choice of an open time limit, Brønne declared, "Aubert accepts" (Nygaard, 2003).

Hydro lost these cases in court; however, its claims on the standard agreement were successful. Although the legal evaluation of the balance between professional autonomy and corporate control was critical to the new terms of appointment at Hydro, the measures of corporate control were introduced as the standard in Norway with the finalization of the standard agreement in 1938. With this standard agreement, Hydro had made its views on quarantine clauses and measures of corporate control legitimate. Not until after WW2 did the standard agreement affect other corporations' use of similar measures, giving rise to the same tensions between engineers as officials and managers.

Concluding remarks

What I earlier referred to as the basic dilemma of the engineering profession—autonomy versus corporate control—was hardly an issue in Norway before the introduction of new letters of appointment at Hydro, the Hydro trials, and the standard agreement for engineering officials. Ironically, the basic dilemma was introduced in Norway by the corporation that had served as a symbol of an autonomous engineering profession and its accomplishments. Hydro's development toward more corporate control was intertwined with local, national, and transnational tendencies.

The crisis facing Hydro in the 1920s was partly perceived as a consequence of the autonomous engineering culture at the corporation, and its new managing director, Aubert, wanted more corporate control. Although Hydro and other Norwegian industrial corporations had not developed bureaucratic organizational structures similar to their German or American counterparts, the tendency toward more corporate control paved the way for a potential clash of interest between autonomy and business loyalty. One can only speculate if this potential would have been released without the allegations of industrial espionage.

As a result of technological and market-related shortcomings, Hydro sought an international partnership. When IG Farben was chosen, the control aspects were further strengthened. To some extent, the interconnections established with the German engineering culture and the introduction of corporate control are surprising. Drawing on the literature on professions and economic history, one might expect the control aspects to be stronger in the United States than in Germany.

The organization of work and engineering activities in industrial organizations is portrayed as more subject to managerial control in the United States than in Germany. However, there are exceptions to this portrayal. The autonomy of engineers existed within German industries but not outside the boundaries of industrial cooperation. In the United States, it was the other way around. Within industrial corporations, strong corporate control challenged professionalism, whereas ventures (e.g., NEC) outside the boundaries of corporations could develop an autonomous engineering culture, benefiting from the competitive environment of American business.

In my view, the historical case study presented here highlights the historical contingency of the relationship between professionalism and bureaucracy. Through its cooperation with a German corporation, Hydro was able to introduce measures more commonly used in American businesses because it operated outside the organized and coordinated German economic society. This finding indicates that there might not be an inherent conflict between professionalism and bureaucratization, nor static national trajectories in the degree and balance of professionalism and bureaucratic organization.

As such, this case study underscores the recent shift in sociology contesting the assertion of an inherent conflict between professionalism and bureaucracy. As indicated at the beginning of this paper, scholars' recent support for the reintegration of theories on professions and organizations seems to be prompted by contemporary developments in the organization of professional work. My historical case study suggests that analyses of interrelations between professions and organizations in the first half of the 20th century also benefit from abandoning the assumption of an inherent conflict between professionalism and bureaucracy. Thus, I wish to advocate a historical-sociological approach. Accounting for both the general patterns and the historical contingencies, I believe that both historical and social scientific analyses of professions and organizations will benefit.

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